Market Imperfections and Import Pricing Behavior by Multinational Enterprises*

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I. Introduction

Recent analysis of trade within the multinational enterprise (MNE) has focused on the ability of the firm to overcome market imperfections. Internationalization of transactions can lead to a more efficient allocation of resources within the firm and allows the MNE to set prices on intrafirm trade to, theoretically, maximize global profits. Incentives to alter transfer prices arise from market imperfections caused by government regulations or "natural" externalities in the transfer of knowledge and information.

This paper links the degree of variation in import prices paid on commodities by MNEs with some of these market imperfections in the setting of a developing nation. It uses data on the import transactions of 100 MNEs which operated subsidiaries in 18 Brazilian manufacturing industries during 1979. Hypotheses concerning the relationship between import (transfer) prices and market imperfections are tested as is the extent to which MNE import (transfer) prices differed from those prices (market-based) paid by Brazilian firms for the same products.

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The evidence from empirical studies, some subject to substantial criticism, has often supported the contention that MNEs alter transfer prices to their advantage (Lall, 1978; Muller and Morganstern; UNCTD, 1978b; Vaitsos). This evidence, however, is subject to alternative interpretations.[1] Differences in the price paid by an MNE subsidiary and that found in world markets may be explained by the allocation of overhead expenditures by the parent firm for such activities as research and product development; differences in the composition and quality of the product themselves; or the transfer price may reflect the outcome of a bargaining process between subsidiaries to determine an efficient resource allocation within the firm. This study's data cannot accurately differentiate among these competing explanations. Therefore, the major interest is to measure the strength of various market imperfections on the extent of MNE price variation from that of Brazilian firms' imports of the same products.[2]

The next section describes features of the Brazilian setting which may affect import pricing behavior. Sampling, data and methodology are outlined in the third section. The empirical analysis begins with a brief comparison of prices paid by Brazilian and MNE firms and ends with a test of the model developed in the methodology section. The final section summarizes the findings and puts them in perspective.

II. The Brazilian Setting

Brazil possesses prominent market imperfections caused by government regulation. There are several major, and sometimes conflicting, potential influences on transfer pricing behavior. Government price controls may have encouraged the overpricing of intermediate good imports so that MNEs could effectively

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[1] Authors who dispute the transfer price manipulation conclusion include J. Fred Weston, 'Do Multinational Corporations have Market Power to Overprice?' in *The Case for the Multinational Corporation*, ed. Carl H. Madden (Prager, 1977): pp. 10-69; and Steven Garber and Steven Klepper, "Administered Pricing", or Competition Coupled with Errors of Measurement?" *International Economic Review* 21, June 1980, 433-435.

[2] Aggregation of product categories does not allow direct comparison of products to determine if they are identical. Some variation in product characteristics within each product category and across firms is likely. See the methodology and data sections for further explanation.

argue that rising costs of production entitled them to price increases. Limits on the official repatriation of profits and a desire to reduce profits taxes are also incentives to overprice imports. On the other hand, a desire to reduce tariff payments and avoid credit controls should have encouraged MNEs to underprice imported goods in those industries where tariffs were not already prohibitive (e.g. most consumer goods). The desire to avoid credit controls, however, was likely lower during 1979 than in earlier periods when growth was more sustained and investment demand stronger.

The Brazilian setting also offers evidence on the relationship between firm profitability and transfer pricing. Two recent studies of manufacturing in Brazil analyzed the impact of ownership on profitability (Newfarmer and Marsh; Mooney). Regardless of which ownership measure or model was used, the results indicated that Brazilian firms were more profitable than foreign firms and domestic-led industries were more profitable than foreign-led industries.

Possible explanations for these relationships are that MNEs are less efficient firms and that industries led by MNEs are more competitive than domestically led ones. Newfarmer and Marsh conclude that the efficiency and competition arguments are not convincing and suggest the negative influence of foreign ownership on profitability may reflect transfer price manipulation. This study will test whether MNEs paid higher prices for imported goods and will either support or refute the Newfarmer and Marsh view.

III. The Model

The model of MNE behavior used here is profit maximization on a global scale subject to constraints imposed by internal (managerial) and external sources (e.g. government agencies, joint venture partners, competitors). Payments to these outside agents may be viewed by the MNE as reducing their revenues and profits. This, however, is only a first approximation. Individual subsidiaries may make higher tax payments than in the absence of altered transfer pricing, for example, but the MNE's global profits may increase as other subsidiaries face reduced tax payments to their host government.

Numerous imperfections have been cited in the theoretical literature as being important influences on the extent and level of transfer pricing. Differences in tax rates between the home and host nation (Bond; Copithorne; Eden; Horst) could encourage the use of transfer pricing. If the host nation has a higher profit tax rate, other things equal,[3] the MNE can reduce its total tax burden by overpricing imports and reporting lower profits there. In a similar manner, MNEs are likely to underprice imports as nominal tariff rates increase in order to lower their custom duties.

The existence of a local partner in a joint-venture has likely impacts both on the extent and direction of transfer pricing. The presence of the local partner may encourage the MNE to over-price imports and reduce reported profits in the subsidiary, profits which must be shared with a partner. On the other hand, the local partner may restrict the MNE's transfer pricing choices by resisting any strategy which lowers subsidiary profits. Although the impact of a joint venture partner is uncertain, the MNE's tendency may be to overprice imports but to a lesser degree than in the absence of the partner.

The structure of the product market may also influence prices paid by MNEs on imports. The more competitive the market becomes, the less control the individual firm has on the final price. This may force producers toward marginal cost pricing on intermediate goods and reduce the direct benefits of a transfer pricing strategy.

Events in the foreign exchange markets may also influence the transfer pricing strategy of MNEs. As the risk of holding a host nation currency rises relative to the currency of the parent firm nation, the MNE may attempt to minimize its holdings of the risky currency by raising import prices to the local subsidiary. This method is only one of many which MNEs could use under such circumstances and may be among the most difficult to im-plement. Therefore, the impact of currency risk on import prices is likely to be weak.

The type of management control system might also dictate the use of transfer prices which deviate from market prices. Decen-

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[3] Of course, other things are not equal. This analysis ignores important considerations such as national differences in administration and enforcement of the tax, accounting principles, and culture which affect tax compliance.

tralized structures prefer not to alter transfer prices often. When prices do not accurately reflect scarcity, resource allocation is distorted, management control may be weakened, and profit figures do not contain the information necessary to evaluate and reward management performance. Centralized management structure makes it easier to implement rapid changes in transfer prices without any loss of information. Therefore, centralized management systems are more likely successful at a transfer pricing strategy to maximize global profits.

Other factors influencing transfer pricing behavior are restrictions on capital or profit repatriation, price controls, and the MNE's perceived political, legal, or market risk. These factors, however, are most important when comparisons are made across nations. As this study looks solely at one nation, these factors will not be considered further.

IV. Data and Sampling

Data on import prices in 1979 were collected for 141 manufacturing firms, both privately owned domestic ones and MNEs, from the Brazilian trade authority. Two measures of import pricing are used. TPRICE is a unit price (U.S. dollars FOB) per kilo of weight. The TPRICE which Brazilian firms pay are assumed to reflect world market prices and are used as a proxy for them. The prices which MNEs pay are treated as transfer prices on intrafirm trade since earlier studies have indicated that a high proportion of subsidiary trade comes from within the parent organization.[4] To measure both the direction and magnitude of MNE pricing policies when compared to world market prices, an index price was calculated. INDEX is the ratio of TPRICE to the mean Brazilian TPRICE for the product category expressed as a percentage:

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[4] Helleiner estimated that intrafirm trade accounts for 25-33 percent of all international trade. Helleiner and Lavergne noted that 54 percent of manufactured goods imported to the United States in 1977 were intrafirm transactions. Newfarmer and Mueller estimated from a sample of 197 MNEs operating in Brazil that almost 74 percent of their imports were with firms related by ownership. It is this last study which serves as the basis for the assumption used here.

$$INDEX_{ij} = \frac{TPRICE_{ij}}{\text{mean Brazilian } TPRICE_i} \times 100$$

where i = the product category

j = the firm

It is important to note that these price variables deviate in several ways from an ideal measure of transaction prices. First, the basic measure (TPRICE) is not a true unit price but is an average over the course of the year. It is calculated, for each product category, as the total value of imports (U.S. dollars FOB) for the year divided by the total weight. Second, differences in unit prices across firms may be due to quality difference rather than price manipulation by MNEs. These differences are limited somewhat by the narrow definition of the products (eight-digit level of the Brazilian import codes) and by sampling procedures (see below). Third, the unit price is a price per unit of weight. This may be misleading for intermediate goods which are sold by piece rather than weight and whose composition may vary due to substitution (e.g. cast iron, steel, alumuninum). There may be a bias in this price measurement if MNEs consistently buy and sell higher quality products than their Brazilian counterparts.

The sample was restricted to firms operating in 18 industries (three-digit level) as defined by Brazil's Ministry of Finance. All sample industries include several of the leading firms as defined by market share. Product categories which were too general to control for quality differences (e.g. "all other pumps") and most capital goods were excluded. Capital goods are often highly differentiated to fit the needs of unique production processes and relatively minor modifications may result in large price differences. All product categories which had only one MNE or one Brazilian firm were eliminated to provide a more accurate INDEX variable. This resulted in a sample of 611 obsevations over 48 product categories. To help identify if there was any bias in the sampling procedure, a second sample was chosen which included only those products with a minimum of three observations in each ownership group. This sample consists of 439 observations spread over 26 products.

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V. Simple Test of Overpricing

The basic hypothesis is that MNEs will overprice imports to lower their tax liability, avoid exchange depreciations and transfer funds to avoid restrictions on profit repatriation. Two factors bias the predicted relationship downward. First, some limited portion of MNE trade is not intrafirm so the price may be a world market price. Second, the transfer price may be understated to achieve goals other than transferring funds abroad. Import prices of MNEs should also exhibit greater variability as some MNEs consistently overprice imports while others underprice.

A paired means test by ownership group was performed for each of the samples for the INDEX variable. The strength of the INDEX measure lies in allowing direct comparisons across products, aggregation, and measurement of the degree of over- and underpricing. Table 1 reveals that for each sample MNEs paid higher prices than Brazilian firms with the degree of overpricing ranging from 21 to 32 percent. Only the larger sample, however, yields results which are significant.

This is not strong evidence of transfer price manipulation by MNEs. The outcome of the first sample, significant overpricing by

Table 1

COMPARISON OF MEAN INDEX PRICES BY OWNERSHIP GROUP

Ownership Group	N	Mean	Standard Deviation	T-statistic	Probability of equal means
48-Product Sample[1]					
MNE	379	132.20	259.64	2.36	0.019
BRAZILIAN	232	100.00	44.81		
26-product Sample[2]					
MNE	265	121.23	296.34	1.14	0.254
BRAZILIAN	174	100.00	48.55		

[1] a minimum of 2 observations in each ownership group (MNE or Brazilian) for each product category.

[2] a minimum of 3 observations in each ownership group (MNE or Brazilian) for each product category.

MNEs, may have explanations other than manipulation. As noted earlier, MNEs may simple import higher quality goods and pay higher prices or Brazilian firms may be more likely to look longer for lower priced products. The significance of the overall means test with the narrower sample also has alternative explanations: MNEs both under- and overprice imports, there are problems in the sampling process, or there is no systematic overpricing by MNES.[5]

The product prices paid by MNEs also exhibited greater variability than Brazilian firms as suggested by a test of equality of variances across all product groups (Table 2). This implies that MNEs both under-and overprice their imports when compared to the Brazilian firm (world market proxy) price. All tests are highly significant.

Table 2

TEST OF EQUALITY OF VARIANCES ACROSS OWNERSHIP GROUPS

Ownership Group	Mean	Variance	F-statistic	Probability of F
48-product Sample[1]				
MNE	132.30	67411.89	531.58	0.0001
BRAZILIAN	100.00	2007.79		
26-product Sample[2]				
MNE	121.23	87818.46	412.63	0.0001
BRAZILIAN	100.00	2356.80		

[1] a minimum of 2 observations in each ownership group (MNE or Brazilian) for each product category.

[2] a minimum of 3 observations in each ownership group (MNE or Brazilian) for each product category.

These tests of sample statistics, although weak, suggest that the Newfarmer-Marsh hypothesis may be correct. Transfer price

[5] The only available proxy for management structure was a dummy variable for the nationality of the parent firm. Arpan and LeCraw among others, have noted that U.S. MNEs tend to be decentralized firms while those from other nations lean toward a centralized management structure. However, a dummy for U.S. firms confuses the separate influences of ownership and management structure, may include other nation-specific influences, and is collinear with the other foreign ownership measure (FOROWN).

manipulation to shift funds out of Brazil is one explanation for MNEs reporting lower profit levels than comparable Brazilian firms.

VI. Regression Model and Results

If MNEs are faced with market imperfections their efficient response is to internalize trade transactions and then manipulate transfer prices to redistribute the efficiency gains. A regression equation developed along the lines suggested in the model section above tests these linkages between transfer prices and measures of market imperfection.

The market imperfection variables and their expected influence on INDEX are:

ADVERT = firm advertising expenditures to sales ratio; a measure of market competition and product differentiation. (+)

EXRISK = foreign exchange risk as measured by the average monthly percentage change in the exchange rate (cruzeiro to dollar) weighted by the subsidiary percentage of trade to each nation. (+)

FOROWN = the percentage of foreign-owned stock; firms with 25 percent or greater foreign ownership are considered MNE; a measure of local participation in joint ventures. (?)

TARIFF = the average nominal tariff on the eight-digit product category. (–)

TAXDIF = the percentage difference in corporate profit tax rates; the rate in the parent firm's nation minus Brazil's rate (–)

Higher tariffs are expected to reduce import prices. Tariffs on the sample's product ranged from 0 to 76 percent. Many of the products chosen for this study are intermediate goods enjoying lower tariff rates so the strength of the relationship should be weakened.

A higher tax rate differential should lower import prices as

MNEs lower global tax payments by reporting more profits in the lower tax nation (Brazil). Tax rates in Brazil, however, are comparable to those in many developed nations (approximately 40 percent). As outlined previously, advertising intensity and exchange risk increase the incentives to overprice imports. The impact of local ownership is uncertain. An acceptable proxy variable for management structure was unavailable and thus omitted from the regression equation.

The 48-product sample described earlier was chosen to test the regression model. Since the equation only models MNE behavior the sample was restricted to 364 observations representing 100 MNEs. Ordinary least squares was used to estimate the regression parameters. Early results indicated the presence of heteroskedasticity caused by the firm's level of product differentiation. The test suggested by Goldfeld and Quandt confirmed the problem. All results reported here have been corrected for the heteroskedasticity problem using a weighting method suggested by Glejser and Kmenta.[6]

The model produced the following results (t-statistics are in parentheses):

$$\text{INDEX} = 38.48 + 19.24 \text{ EXRISK} - 0.63 \text{ TARIFF} + 0.66$$
$$\quad\quad\quad (2.33)\quad (2.42)\quad\quad\quad (1.84)\quad\quad\quad\quad (2.26)$$

$$\text{TAXDIF} \quad -0.19 \text{ FOROWN} - 22.24 \text{ ADVERT}$$
$$\quad\quad\quad\quad (0.83)\quad\quad\quad\quad\quad (0.43)$$

$$\overline{R}^2 = .16 \quad F = 14.95 \quad n = 364$$

It appears that MNEs do respond to government-related imperfections. When the cruzeiro depreciates against other currencies, the regression model indicates that MNE prices rise substantially over that paid by Brazilian firms. The size of this coefficient may reflect expectations about developments on the foreign exchange markets including the ability of Brazil to finance its imports and the stability of the government in the face of trade deficits and the burden of foreign debt. Altering transfer prices is

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[6] An iterative method revealed that the disturbance term was properly specified as $\sigma_i^2 = \sigma^2 z^{.75}$ where $z = \text{ADVERT}$.

not the most direct method MNEs have to avoid depreciation losses, it interferes with optimal allocation of resources within the MNE, and complicates evaluation of management performance. Expectations may, therefore, play a major role in interpreting these results.

Tariffs also exert a significant influence on MNE import prices. As expected, products facing higher nominal tariffs have lower prices, presumably to reduce the firm's payments to the host government. These tariffs range from less than one percent to 76 percent and, given the coefficient's size, can substantially influence the import price.

The only other variable to exert a significant influence on pricing is the corporate income tax rates. However, the coefficient takes on an unexpected positive sign. A possible explanation is that the variable reflects the "official" tax rate in each nation while the "effective" tax rate, which MNEs use for decision making, may be substantially different. Limitations on the repatriation of profits from Brazilian subsidiaries, for instance, raises the "effective" tax rate in Brazil and encourages other methods for transferring funds (e.g. transfer price manipulation).

None of the other independent variables exert a statistically significant influence on import pricing. The influence of foreign ownership is perhaps dissipated by opposite forces: local supervision reducing INDEX versus the desire by MNEs to appropriate profits by overpricing imports. The poor performance of ADVERT suggests that measures of market competition (or product differentiation) are not important or that a better proxy variable is needed. A four-firm concentration ratio was substituted in the model without success. Many manufacturing industries in Brazil are highly concentrated and dominated by MNEs, so the four-firm ratio may not exhibit sufficient variation to be a powerful explanatory variable.

VII. Summary

Examination of sample data showed that MNEs paid higher prices on imported products than Brazilian firms. Using an indexed set of prices with the mean Brazilian price in each product category as the base, import prices for MNE subsidiaries were 21

and 32 percent higher than Brazilian manufacturing firms in two selected samples. Import prices for MNEs were not only higher on average, but they also exhibited greater variability than domestic firm prices according to a test for equality of variances across all product groups. Apparently, MNEs both under- and over price imports. The findings suggest that subsidiaries in Brazil, in general, overprice their imports and the extent of over-pricing across firms and products varies considerably.

These conclusions, however, should be interpreted cautiously for several reasons. Incomplete control for quality differences in products and other measurement problems reduce the reliability of the "bottom-line" numbers noted above. Furthermore, the methodological assumption that the prices paid by Brazilian firms are "world market prices" while those paid by MNEs are "transfer prices" is not entirely accurate.

Other factors suggest that the extent of overpricing may be understated. The product selection process ignored capital and highly differentiated goods because it is difficult to assess how much of the price differential across firms is due to quality or transfer pricing policy. Transfer price manipulation is more likely to be practiced in these differentiated products because it is difficult to detect. The second explanation concerns the direction of pricing. As long as some subsidiaries underprice imports (e.g. to reduce tariff payments), the extent of overpricing is understated.

One group of MNE analysts suggests that MNE's formulate an efficient internal response to market imperfections and may use transfer price policy to redistribute the gains. The market imperfections found most influential on import prices were government-related: nominal tariffs, national differences in tax rates, and exchange rate risk. A disturbing development was that the tax rate difference exerted an influence opposite of the predicted one. Restrictions on profit repatriation and compliance enforcement might raise the "effective" tax rate in Brazil above the nominal rate and explain the statistical result. More study on this issue is needed.

All the non-government imperfections included in the regression model were insignificant. This is somewhat misleading in the case of foreign ownership where two influences pull in opposite

directions. Increased local ownership may encourage some MNEs to overprice imports to siphon some local profits toward the parent firm. On the other hand, MNEs are less likely successful in transfering profits when strong local ownership exists.

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